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Report on the individual review of the annual submission of Monaco submitted in 2017*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas (GHG) inventory covering emissions and removals of GHG emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2017 annual submission of Monaco, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 25 to 30 September 2017 in Bonn, Germany.

* In the symbol for this document, 2017 refers to the year in which the inventory was submitted, not to the year of publication.

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Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A sources	source categories included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
C	carbon
CEF	carbon emission factor
CER	certified emission reduction
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
$F_{IND-COM}$	fraction of industrial and commercial protein co-discharged into the sewer system
FM	forest management
FMRL	forest management reference level
$F_{NON-CON}$	fraction of non-consumed protein added to wastewater
GHG	greenhouse gas
GM	grazing land management
guidelines for national systems	"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol"
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance	*Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*
IPPU	industrial processes and product use
KP-LULUCF activities	activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
N	nitrogen
NA	not applicable
NE	not estimated
$N_{EFFLUENT}$	total annual amount of nitrogen in wastewater effluent
NF_3	nitrogen trifluoride
NH_3	ammonia
NIR	national inventory report
NO	not occurring

NOx	nitrogen oxides
N_2O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SMEG	Société Monégasque de l'Electricité et du Gaz
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction[1]

1. This report covers the review of the 2017 annual submission of Monaco organized by the secretariat, in accordance with the Article 8 review guidelines (decision 22/CMP.1, as revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (decision 13/CP.20). The review took place from 25 to 30 September 2017 in Bonn, Germany, and was coordinated by Ms. Lisa Hanle, Ms. Alma Jean and Mr. Simon Wear (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of Monaco.

Table 1
Composition of the expert review team that conducted the review of Monaco

Area of expertise	*Name*	*Party*
Generalist	Ms. Mausami Desai	United States of America
	Ms. Jolanta Merkelienė	Lithuania
Energy	Mr. Naofumi Kosaka	Japan
	Ms. Brooke Perkins	Australia
	Mr. Michael Smith	New Zealand
IPPU	Mr. Kendal Blanco-Salas	Costa Rica
	Ms. Ils Moorkens	Belgium
	Mr. Ioannis Sempos	Greece
Agriculture	Ms. Marta Alfaro	Chile
	Ms. Fatou Gaye	Gambia
	Ms. Alice Ryan	New Zealand
LULUCF	Ms. Esther Mertens	Belgium
	Mr. Koki Okawa	Japan
	Mr. Igor Onopchuk	Ukraine
	Mr. Iordanis Tzamtzis	Greece
Waste	Mr. Mark Hunstone	Australia
	Mr. Gabor Kis-Kovacs	Hungary
	Mr. Phindile Mangwana	South Africa
Lead reviewers	Ms. Alfaro	
	Mr. Hunstone	

2. The basis of the findings in this report is the assessment by the ERT of the consistency of the Party's 2017 annual submission with the Article 8 review guidelines.

[1] At the time of publication of this report, Monaco had submitted its instrument of ratification of the Doha Amendment; however, the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

The ERT has made recommendations that Monaco resolve the findings related to issues,[2] including issues designated as problems.[3] Other findings, and, if applicable, the encouragements of the ERT to Monaco to resolve them, are also included.

3. A draft version of this report was communicated to the Government of Monaco, which provided no comments.

4. Annex I shows annual GHG emissions for Monaco, including totals excluding and including the LULUCF sector, indirect CO_2 emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected, by gas, sector and activity for Monaco.

5. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the 2017 annual submission

6. Table 2 provides the assessment by the ERT of the annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
Summary of review results and general assessment of the inventory of Monaco

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
Dates of submission	Original submission: 20 September 2017 (NIR), 20 April 2017, Version 2 (CRF tables), 22 September 2017 (SEF-CP2-2016)		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	1. Have any issues been identified in the following areas:		
	(a) Identification of key categories	No	
	(b) Selection and use of methodologies and assumptions	Yes	L.11, L.13
	(c) Development and selection of EFs	Yes	E.13, E.14
	(d) Collection and selection of AD	Yes	E.2, E.6, E.7, E.16
	(e) Reporting of recalculations	Yes	G.8, I.13, L.12
	(f) Reporting of a consistent time series	Yes	I.8
	(g) Reporting of uncertainties, including methodologies	Yes	G.16, L.7
	(h) QA/QC	QA/QC procedures were assessed in the context of the national system (see para. 2 in this table)	
	(i) Missing categories/completeness[b]	Yes	I.11, I.12, KL.1
	(j) Application of corrections to the inventory	No	

[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.

[3] Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

Assessment			*Issue or problem ID[a](s) in table 3 and or 5[a]*
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	NA	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	E.11, I.14, L.10, W.2
Supplementary information under the Kyoto Protocol	2. Have any issues been identified related to the national system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	Yes	G.2, G.10, G.11, G.17, G.21
	(b) Performance of the national system functions	Yes	G.1, G.3, G.4, G.5, G.6
	3. Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry	NA	
	(b) Performance of the functions of the national registry and the technical standards for data exchange	NA	
	4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, taking into consideration any findings or recommendations contained in the SIAR?	Yes	G.19
	5. Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, including any changes since the previous annual submission?	No	
	6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows:		
	(a) Reporting requirements in decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.2
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14	No	
	(c) Reporting requirements of decision 6/CMP.9	Yes	KL.1, KL.3
	(d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	NA	
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	No	G.18

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Did the Party submit a revised estimate to replace a previously applied adjustment?	NA	Monaco does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Partially	G.21
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	Yes	Please refer to annex III for a list of questions and issues to be considered during this in-country review
Questions of implementation	Did the ERT list a question of implementation?	Yes	G.17

[a] The ERT identified additional issues and/or problems in all sectors that are not listed in this table but are included in table 3 and/or 5.

[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of issues and/or problems raised in the previous review report

7. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 29 August 2017.[4] For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2017 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of Monaco

ID#	*Issue and/or problem classification[a]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Annual submission (G.1 and G.15, 2015) (7, 2014) Adherence to the UNFCCC Annex I inventory reporting guidelines	Submit all the elements of the next inventory by 15 April 2015, as required by decision 24/CP.19.	Not resolved. The 2016 NIR was submitted on 12 September 2017 and the 2017 NIR was submitted on 20 September 2017. During the review, Monaco stated that the 2018 submission will be submitted on time (see ID# G.17 in table 5).

[4] FCCC/ARR/2015/MCO. Monaco did not submit the NIR for the 2016 annual submission until 12 September 2017. The 2016 annual submission of Monaco has not yet been reviewed and therefore is not included in this table.

ID#	*Issue and or problem classification[a]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
G.2	Inventory planning (G.2, 2015) (17, 2014) (12, 2013) Accuracy	Strengthen cooperation with national institutions and companies in order to increase the use of available country-specific data for the preparation of the inventory so as to develop more accurate estimates.	Addressing. Monaco explained that this work is ongoing (see ID#s E.1 and E.2 below). Chapter 10 of the NIR identifies areas where cooperation has been strengthened and access to country-specific data has been improved.
G.3	Inventory planning (G.3, 2015) (15, 2014) Adherence to the UNFCCC Annex I inventory reporting guidelines	Amend the annex with information on the QA/QC and verification procedures implemented for each of the sectors.	Not resolved. The 2017 NIR does not include this annex. During the review, Monaco explained that this annex will be included in the next submission.
G.4	Inventory planning (G.4, 2015) (18, 2014) (12(c), 2013) Adherence to the UNFCCC Annex I inventory reporting guidelines	Continue updating and improving the QA/QC plan, with a view to improving the effectiveness of the QA/QC procedures.	Addressing. During the review, Monaco explained that updates and improvements to the QA/QC plan are ongoing. Monaco did not provide the ERT with an updated plan and explained that chapter 1 of the NIR contains a basic description of the QA/QC roles and procedures applied (see ID# G.17 in table 5).
G.5	Inventory planning (G.5, 2015) (18, 2014) (12, 2013) (16, 2012) Adherence to the UNFCCC Annex I inventory reporting guidelines	Provide information concerning the implementation of the QA/QC plan, in particular regarding the prioritization of inventory improvements on the basis of the key category analysis and uncertainty assessment.	Addressing. Monaco demonstrates the application of QA/QC procedures within most category sections, including improvements to some key categories resulting from QA, as reported in chapter 10 of the NIR (see ID# I.2 below). During the review, Monaco explained that efforts to address this as part of its inventory planning process are in progress and will be reported on more transparently in the next NIR (see ID# G.6 below).
G.6	Inventory planning (G.6, 2015) (19, 2014) (12, 2013) (24, 2012) Adherence to the UNFCCC Annex I inventory reporting guidelines	Revise the organization of the QA activities, taking into account that, in principle and in accordance with the IPCC good practice guidance, these should not be carried out by experts involved in the preparation of the inventory.	Not resolved. During the review week, Monaco explained that owing to the delays in the preparation of the 2017 NIR, no QA activities were implemented by external experts not involved in the inventory compilation process.
G.7	Key category analysis (G.9, 2015) (23, 2014) (19, 2013) Adherence to the UNFCCC Annex I inventory reporting guidelines	Ensure the consistent reporting of the key categories between the NIR and the CRF tables. For example, the information in CRF table 7 includes only references to the level assessment, and the N_2O emissions from road transportation have not been included in the list of key categories in the CRF tables.	Resolved. The key category analysis included in the introduction of chapter 1 of the NIR is consistent with the CRF tables (see ID# G.15 in table 5).
G.8	Recalculations (G.11, 2015) (13, 2014)	Report the recalculations under each category and inc'ude a clear explanation of the reasons for the recalculations	Addressing. Monaco has included some explanations of recalculations, including sources of information and assumptions

ID#	Issue and or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	Adherence to the UNFCCC Annex I inventory reporting guidelines	made in the course of previous reviews, clearly distinguishing them from the recalculations made for the purpose of the current submission.	since the previous submission, in accordance with decision 24/CP.19, annex I, paragraphs 43, 44 and 50(h). The ERT notes that not all recalculations have been justified or explained consistent with decision 24/CP.19, annex I, paragraph 50(h) (see ID#s I.13, L.12 and L.15 in table 5).
G.9	Uncertainty analysis (G.13, 2015) (24, 2014) (15, 2013) (20, 2012) Adherence to the UNFCCC Annex I inventory reporting guidelines	Use the 95 per cent confidence interval to report uncertainties, as recommended in the IPCC good practice guidance, to ensure comparability with the reporting of other Parties.	Resolved. Monaco provided, in annex 2 to the NIR, a summary of the uncertainty analysis consistent with the 2006 IPCC Guidelines (volume 1, table 3.3).
G.10	National system (G.7, 2015) (20, 2014) (12, 2013) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	Implement measures to strengthen the national system.	Addressing. Monaco explained that work is ongoing to sufficiently implement measures to adhere to the UNFCCC Annex I inventory reporting guidelines. Improvements were noted in chapter 10 of the NIR, indicating that measures are being implemented to improve specific functions of the national system, such as QA implementation and data collection (see ID#s G.1 and G.2 above, G.11, E.1 and E.2 below and G.17 in table 5).
G.11	National system (G.8, 2015) (21, 2014) (12, 2013) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	In order to improve the national system, ensure that adequate resources are allocated to the preparation of the inventory.	Addressing. Monaco explained in its NIR (section 13.2) that it has strengthened its financial capacity for the production and reporting of the inventory. During the review, Monaco further explained that a new staff member will join the inventory agency and increase the national capacity to prepare the inventory (see ID# G.17 in table 5).
G.12	CPR (G.16, 2015) Transparency	Report information on the calculation of the CPR in the NIR.	Resolved. Monaco has reported information on the calculation of the CPR in the NIR (p.203). However, the calculation is based on an error in the determination of the base year (see ID# G.18 in table 5).
G.13	Kyoto Protocol units (G.17, 2015) Transparency	Report SEF tables and use the notation key "NO" in cases where no units of a particular type occurred in a transaction.	Resolved. SEF tables were not included with Monaco's 2017 submission; however, prior to the review week (on 22 September 2017), Monaco submitted its SEF tables and used the notation key "NO" (see ID# G.19 in table 5).
Energy			
E.1	Fuel combustion – reference approach (E.4, 2015) (35, 2014) (29, 2013) Transparency	Explain the difficulties with the availability of information in the NIR and try to develop methods to collect data in order to complete the reference approach.	Addressing. Monaco explained that an actual survey concerning transport is in progress for the reference approach (see NIR section 3.2.5.4.5). During the review, the Party also explained that this issue will be examined further for the next

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
			submission.
E.2	International bunkers and multilateral operations (E.5, 2015) (36, 2014) (31, 2013) (37, 2012) Accuracy	Repeat the survey on international and domestic navigation on a regular basis to enhance the accuracy of the allocation of emissions between international and domestic navigation.	Addressing. Monaco conducted the survey in 2016 and is analysing the data.
E.3	Feedstocks, reductants and other non-energy use of fuels (E.6, 2015) (37, 2014) (35, 2013) (39, 2012) Comparability	Revise the reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d) in a consistent manner under the energy and industrial processes sectors and explain in the NIR the use and disposal of lubricants in the country.	Addressing. Monaco now reports bitumen and lubricants as "NO" in CRF table 1.A(d). Monaco explained that the reason for not including bitumen in CRF table 1.A(d) is that the CO_2 emissions reported for road paving with asphalt (2.D.3) are indirect CO_2 emissions from atmospheric oxidation of non-methane volatile organic compounds. The ERT does not agree with this approach because the fact that the indirect emissions from road paving with asphalt are reported means that bitumen is delivered to Monaco, and therefore this bitumen should be reported. The AD for excluded carbon for bitumen are for total deliveries (see the 2006 IPCC Guidelines, volume 2, section 6.6.4). The explanation provided by Monaco is also inconsistent with chapter 9 of the NIR. The discussion on emissions from lubricants can be found under the IPPU sector (see ID# 1.11 in table 5).
E.4	1.A.1 Energy industries – biomass – CO_2 (E.7, 2015) (38, 2014) (36, 2013) Accuracy	Investigate the possibility of collecting information on the composition of the municipal solid waste incinerated and determine a country-specific EF in order to apply a tier 2 method for the category.	Resolved. Monaco has applied a tier 2a method for CO_2 emissions with a country-specific total waste amount and waste fraction since the 2015 submission. This methodological choice is consistent with the decision tree provided in the 2006 IPCC Guidelines (volume 5, figure 5.1).
E.5	1.A.1.a Public electricity and heat production – biomass – CO_2, CH_4 and N_2O (E.9, 2015) (40, 2014) (54, 2013) Adherence to the UNFCCC Annex I inventory reporting guidelines	Improve QA/QC checks in order to avoid mistakes associated with the use of notation keys in future annual submissions.	Resolved. Biomass consumption under the category public electricity and heat production is correctly reported.
E.6	1.A.4 Other sectors – all fuels – CO_2, CH_4 and N_2O (E.10, 2015) (42, 2014) (44, 2013)	Make efforts to report emissions from the commercial/institutional and residential subcategories separately.	Addressing. CO_2, CH_4 and N_2O emissions continue to be reported aggregated under the residential category. During the review, Monaco explained that it plans to separate the subcategories if the development of some tools by other organizations is

ID#	Issue and or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	(44, 2012) (35, 2011) (37, 2010) (46, 2009) (34, 2008) Comparability		completed and sufficient data become available.
E.7	1.B.2.b Natural gas – gaseous fuels – CI . (E.11, 2015) Comparability	Use natural gas utility sales expressed in m^3 as AD in the CRF tables.	Addressing. Monaco changed the reporting of AD in CRF table 1.B.2 from "kt of CH_4" to "m of CH_4" (pipeline length of natural gas). Footnote 1 to the table requires that the unit of the AD in the unit column be specified in either energy units or volume units (e.g. PJ, 10^6 m^3 and 10^6 barrel/year).
E.8	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.12, 2015) Accura	Correct the EF for natural gas distribution and enhance QA/QC procedures to avoid this error in the future.	Resolved. Monaco changed the EF for metering equipment from 303 mg/unit/hour (table 6-7 of the Compendium of the American Petroleum Institute (2009)) to 14.5 kg/unit/year (table 6-8), leading to an increase in estimated CH_4 emissions. The ERT agrees with the Party's reporting.
E.9	1.B.2.b Natural gas – gaseous fuels – CO_2 (E.13, 2015) Transparency	Correct, in the NIR, the transcription error for the EF for CO_2 emissions from medium pressure (four bars) cast iron pipes and improve QA/QC procedures to avoid such errors in the future.	Resolved. No transcription error was observed by the ERT. Monaco applies a CO_2 EF of 280 kg/km/year for cast iron pipes, which is consistent with table 6-10 of the American Petroleum Institute Co npendium.
E.10	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.14, 2015) Accuracy	Verify the gas composition in natural gas distribution with the energy provider and, if necessary, adjust the appropriate EFs taken from the American Petroleum Institute Compendium.	Resolved. Monaco consulted with the energy provider and although that provider did not have the exact gas composition, the gas composition for southern France was provided. The ERT further notes that the initial estimates of gas composition provided by Monaco during the previous review are within the uncertainty range provided in table E-4 of the American Petroleum Institute Compendium.
IPPU			
I.1	2. General (IPPU) (I.1, 2015) (45, 2014) Transparency	Improve the reporting on recalculations for the IPPU sector by ensuring that the information is updated and by including information on the rationale for and impact of the recalculations.	Resolved. A complete description of the recalculations is included in the NIR (sections 4.2.4 and 4.2.6).
I.2	2. General (IPPU) (I.2, 2015) (47, 2014) Transparency	Report more clearly on the questionnaires used to collect data on the consumption of halocarbons and SF_6 and on any QA/QC and verification procedures applied to the data.	Resolved. The NIR (section 4.6) contains information on QC procedures and more specific information on how the data are collected and cross-checked, as well as on how emissions are calculated and archived.
I.3	2.D Non-energy products from fuels and solvent use – CO_2 (I.2, 2015) (55, 2014)	Include information explaining the deviation in trends (e.g. CO_2 emissions from paint application) in the NIR.	Resolved. No variations were observed for this category in the latest submission.

ID[a]	*Issue and or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	Transparency		
I.4	2.F Product uses as substitutes for ozone-depleting substances – PFCs (I.4, 2015) (49, 2014) (62, 2013) Transparency	Include information on the trend in the use of PFCs and ensure that the information collected on PFCs is complete and, even if no emissions from manufacturing are occurring, ensure that all emissions from stock and disposal are included or an explanation for the lack of emissions is provided.	Addressing. PFC emissions from stocks are now reported for the entire time series but information on the trend in the use of PFCs is not yet included.
I.5	2.F.1 Refrigeration and air conditioning – HFCs, PFCs and SF_6 (I.5, 2015) (48, 2014) Accuracy	Justify and explain the use of the product life factors.	Resolved. The product life factors used are described in the NIR (pp.143 and 144 for mobile air conditioning and pp.150–153 for other categories). For stationary air conditioning, the emissions are determined on the basis of the mass balance.
I.6	2.F.1 Refrigeration and air conditioning – HFCs (I.8, 2015) Transparency	Include more details about data collection (questionnaires) for the HFC emission estimates, not only for domestic but also for all refrigeration subcategories.	Resolved. The relevant information is included in the NIR (p.136 for domestic and commercial refrigeration and stationary air conditioning, and pp.137–144 for mobile air conditioning).
I.7	2.F.1 Refrigeration and air conditioning – HFCs (I.8, 2015) Transparency	Update the NIR text for domestic refrigeration with the new equation 7.9 from the 2006 IPCC Guidelines (tier 2b methodology) used for the estimation for this category.	Resolved. The new equation was included in the NIR (p.151).
I.8	2.F.5 Solvents – N_2O (I.6, 2015) (54, 2014) Accuracy	Justify the application of the EF for aerosol cans and verify the applicability of constant emissions across the time series.	Not resolved. Monaco continues to report a constant EF ($6.00*10^{-5}$ t N_2O/t) and AD (13,297 cans), which is not justified in the NIR. During the review, Monaco explained that as it does not have in-country data, it has been using the methodology applied by France since its 2014 NIR: (amount of cans/population of France in 2012) multiplied by the population of Monaco in 2012. Monaco also explained that since 2012, the number of cans is constant in France despite the growing population. The ERT noted that this does not explain the constant AD applied to Monaco for the period 1990–2015.
I.9	2.G.1 Electrical equipment – SF_6 (I.7, 2015) (50, 2104) Adherence to the UNFCCC Annex I inventory reporting guidelines	Strengthen the QA/QC activities before submitting the annual inventory.	Resolved. SF_6 emissions from electrical equipment were included in the background data CRF table, suggesting that QA/QC activities have been strengthened.
I.10	2.G.3 N_2O from product uses – N_2O (I.9, 2015) Transparency	Reassess the QA/QC checks and procedures related to the IPPU sector, specifically focusing on the key category refrigeration and air conditioning, in order to reflect the proper descriptions of	Resolved. The ERT notes that the previous recommendation, while broad, resulted from a specific concern regarding the N_2O IEF for medical applications, and the fact that the value reported in CRF table 2(I).A-Hs2

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		methodologies, EFs and data used for the estimation of GHG emissions for this sector.	was not the one used in the calculations. In the 2017 NIR, Monaco described the method used (p.153). The method does not necessarily lead to an IEF of 1, because the method (equation 8.24 from the 2006 IPCC Guidelines, volume 3, chapter 8) covers more than one year as both supply and use are assumed to be continuous over the year; in other words, N_2O supplied in the middle of year t–1 is not fully used and emitted until the middle of year t. The ERT did not identify any problems with the Party's reporting, suggesting that QA/QC checks have been effective.
Agriculture			
		No previous recommendations were identified for this sector.	
LULUCF			
L.1	4. General (LULUCF) (L.1, 2015) (61, 2014) (74, 2013) Comparability	Provide more transparent information on the calculation of emissions from the burning of biomass of green waste, to ensure the consistency of the information reported, and on the allocation of emissions and carbon stock changes between the LULUCF, waste and energy sectors.	Addressing. Monaco continues to report "NO" for AD and CO_2, CH_4 and N_2O emissions from biomass burning in CRF table 4(V). Monaco provided in its NIR the total amount of woody and non-woody green waste from parks and gardens for both the energy (p.221) and the LULUCF (p.166) sectors (see ID# L.11 in table 5 for an additional finding related to the carbon stock changes from extraction of biomass from green spaces).
L.2	4. General (LULUCF) (L.4, 2015) Comparability	Report fully completed CRF tables and resolve the inconsistent use of the notation keys (e.g. in table 4(IV), for indirect N_2O emissions from managed soils, "NO" is reported instead of "NE").	Addressing. Monaco has addressed the inconsistent use of notation keys in CRF tables 4.D, 4(II) and 4(III). Indirect N_2O emissions from atmospheric deposition have been estimated and are reported in CRF table 4(IV). However, the ERT notes that N leaching and run-off has been reported as "NO", although minor leaching might occur and therefore should be reported as "NE". Additional issues have been raised related to the use of notation keys (see ID#s L.1 above and L.9 and L.11 in table 5).
L.3	4.E.1 Settlements remaining settlements – CO_2 (L.2, 2015) (63, 2014) Transparency	Provide the relevant information when applying a tier 1a method, to increase the transparency of the reporting.	Resolved. Monaco provided information in the NIR on the tier 2a method from the 2006 IPCC Guidelines (volume 4), including equation 8.2 on the annual area of tree crown cover below and above 20 years (p.167), and specified its use of the IPCC default EF (see ID# L.5 below).
L.4	4.E.1 Settlements remaining settlements – CO_2 (L.3, 2015) (65, 2014) Transparency	Ensure the consistent and transparent reporting of the emission estimates and provide as much information as possible in the NIR.	Resolved. Monaco has provided additional information on fertilizer application (see ID# L.14 in table 5) and on the IPCC methodology used in the NIR (section 6.4.2.2).

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
L.5	4.E.1 Settlements remaining settlements – CO_2 (L.6, 2015) Transparency	Increase the transparency of the reporting of carbon stock changes in biomass, providing the AD (crown cover area) used to apply equation 8.2 from the 2006 IPCC Guidelines.	Resolved. Monaco has provided the AD used to apply equation 8.2 in the NIR (p.168). An additional finding has been raised related to the transparency of the calculation of the crown cover area (see ID# L.11 in table 5).
L.6	4.E.1 Settlements remaining settlements – CO_2 (L.7, 2015) Transparency	Include aerial/satellite information to transparently demonstrate that any increase in biomass from growing crown cover is not a land-use change to settlements, to demonstrate that any increase in crown cover does not meet the forest definition and to improve the accuracy of the measurement of crown cover.	Addressing. Monaco has included in its NIR a map of green zones and a orthophoto with the visualization of crown cover (p.165). However, an analysis of the time series of spatial information to demonstrate the area of crown cover changes reported in the table on page 168 of the NIR is lacking.
L.7	4.E.1 Settlements remaining settlements – CO_2 (L.8, 2015) Transparency	Include the right uncertainty values for AD (an incorrect value of 50 per cent uncertainty was applied) and document the methodology by which expert judgment is used to determine uncertainty values for this category.	Addressing. The uncertainty values have been corrected. The transparency of the Party's reporting could be increased if the expert judgment were conducted in accordance with the 2006 IPCC Guidelines (volume 1, chapter 3, section 3.2.1.3) and documented in accordance with the protocol for expert elicitation (volume 1, chapter 2, annex 2A.1).
L.8	4(V) Biomass burning – CO_2 (L.5, 2015) Comparability	Allocate biogenic CO_2 emissions from biomass burning for electricity to incineration and open burning of waste, in accordance with the 2006 IPCC Guidelines (volume 5, chapter 5).	Resolved. Monaco has reported all biogenic waste under the energy sector since all such waste is used for energy purposes. The CO_2 emissions (42.82 t CO_2 for 2015) are reported under memo items in CRF table 1s2 under energy and the notation key "IE" is reported in CRF table 5.C under waste, in accordance with the 2006 IPCC Guidelines (volume 5, p.5.5) (see ID# L.11 in table 5).
Waste			
W.1	5.D.1 Domestic wastewater – CH_4 (W.3, 2015) Transparency	Improve the description of the quantification of CH_4 emissions from domestic wastewater treatment and discharge.	Resolved. The NIR contains a significantly extended methodological description with a transparent summary of the parameters used (see sections 7.2.4.1 and 7.3.1).
KP-LULUCF			
KL.1	General (KP-LULUCF) – CO_2 (KL.1, 2015) Completeness	Use the appropriate notation keys in the KP-LULUCF CRF tables to report on all mandatory activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.	Not resolved. Monaco left the complete set of KP-LULUCF CRF tables blank. During the review, Monaco explained that quality checks to correct mistakes in the CRF reporting are being implemented between the 2016 and 2018 submissions.

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue and/or problem was raised. Issues are identified in accordance with paragraphs 80–83 of the UNFCCC review guidelines and classified as per paragraph 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with paragraph 69 of the Article 8 review guidelines, in conjunction with decision 4/CMP.11.

IV. Issues identified in three successive reviews and not addressed by the Party

8. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2017 annual submission of Monaco, and have not been addressed by the Party.

Table 4
Issues identified in three successive reviews and not addressed by Monaco

ID[a]	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed[b]*
General		
G.1	Submit all the elements of the next inventory, as required by decision 24/CP.19	3 (2014–2017)
G.2	Strengthen cooperation with national institutions and companies in order to increase the use of available country-specific data for the preparation of the inventory so as to develop more accurate estimates	4 (2013–2017)
G.3	Amend the annex with information on the QA/QC and verification procedures implemented for each of the sectors	3 (2014–2017)
G.4	Continue updating and improving the QA/QC plan with a view to improving the effectiveness of the QA/QC procedures	4 (2013–2017)
G.5	Provide information concerning the implementation of the QA/QC plan, in particular regarding the prioritization of inventory improvements on the basis of the key category analysis and uncertainty assessment	5 (2012–2017)
G.6	Revise the organization of the QA activities, taking into account that, in principle and in accordance with the IPCC good practice guidance, these should not be carried out by experts involved in the preparation of the inventory	5 (2012–2017)
G.8	Report the recalculations under each category and include a clear explanation of the reasons for the recalculations made in the course of previous reviews, clearly distinguishing them from the recalculations made for the purpose of the current submission	3 (2014–2017)
G.10	Implement measures to strengthen the national system	4 (2013–2017)
G.11	In order to improve the national system, ensure that adequate resources are allocated to the preparation of the inventory	4 (2013–2017)
Energy		
E.1	Explain the difficulties with the availability of information in the NIR and try to develop methods to collect data in order to complete the reference approach	4 (2013–2017)
E.2	Repeat the survey on international and domestic navigation on a regular basis to enhance the accuracy of the allocation of emissions between international and domestic navigation	5 (2012–2017)
E.3	Revise the reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d) in a consistent manner under the energy and industrial processes sectors and explain in the NIR the use and disposal of lubricants in the country	5 (2012–2017)
E.6	Make efforts to report emissions from the commercial/institutional	9 (2008–2017)

ID[a]	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed[b]*
	and residential subcategories separately	
IPPU		
I.4	Include information on the trend in the use of PFCs and ensure that the information collected on PFCs is complete and, even if no emissions from manufacturing are occurring, ensure that all emissions from stock and disposal are included or an explanation for the lack of emissions is provided	4 (2013–2017)
I.8	Justify the application of the EF for aerosol cans and verify the applicability of constant emissions across the time series	3 (2014–2017)
Agriculture		
	No such issues for the agriculture sector were identified	
LULUCF		
L.1	Provide more transparent information on the calculation of emissions from the burning of biomass of green waste, to ensure the consistency of the information reported, and on the allocation of emissions and carbon stock changes between the LULUCF, waste and energy sectors	4 (2013–2017)
Waste		
	No such issues for the waste sector were identified	
KP-LULUCF		
	No such issues for KP-LULUCF activities were identified	

[a] Monaco did not submit the NIR for the 2016 annual submission until 12 September 2017. The review of the 2016 annual submission of Monaco has not yet been conducted and therefore is not included in this table in the counting of successive reviews.

V. Additional findings made during the 2017 individual inventory review

9. Table 5 contains findings made by the ERT during the individual review of the 2017 annual submission of Monaco that are additional to those identified in table 3.

Table 5
Additional findings made during the 2017 individual review of the annual submission of Monaco

ID[a]	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and or a problem?[b] If yes, classify by type*
General			
G.14	QA/QC and verification	The ERT noted that Monaco's NIR does not describe changes in response to the review process as required by decision 24/CP.19, annex I, paragraph 50(i). During the review, Monaco explained that it will improve the transparency of reporting on changes in response to the review process in the next submission. The ERT recommends that Monaco provide in the NIR explanations of changes made in response to recommendations from previous reviews, including UNFCCC technical expert reviews.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
G.15	Key category analysis	The ERT noted that the presentation of the key categories identified in the NIR did not follow the format of tables 4.2 and 4.3 from volume 1 of the 2006 IPCC Guidelines, as set out in decision 24/CP.19, annex I, paragraph 39. During the review, Monaco explained that it will use tables 4.2 and 4.3 from the 2006 IPCC Guidelines in the next submission. The ERT encourages Monaco to present the results of the key category analysis following the format of tables 4.2 and 4.3 from volume 1 of the 2006 IPCC Guidelines.	Not an issue/problem
G.16	Uncertainty analysis	The ERT noted that the reporting of uncertainties in the NIR did not consistently indicate the underlying assumptions for the purposes of helping to prioritize efforts to improve the accuracy of national inventories in the future and to guide decisions on methodological choice, as required by decision 24/CP.19, annex I, paragraphs 42 and 50(g). For example, there is no separate section in the NIR containing a discussion on uncertainty assumptions for category 1.A.3.b road transportation (a key category) and therefore no information to support the uncertainty estimates for the AD and EFs presented in annex 2 to the NIR. Lastly, Monaco does not consistently include qualitative descriptions of the uncertainty as encouraged by the UNFCCC Annex I inventory reporting guidelines (para. 15), in particular for key categories. The ERT recommends that Monaco include in the NIR explanations of the underlying assumptions used to quantify and estimate the uncertainty for all categories. Where feasible, in particular for key categories, the ERT encourages Monaco to also include qualitative discussions of uncertainty.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
G.17	National system	The ERT notes that the Party is not sufficiently implementing decision 15/CMP.1 in conjunction with decision 3/CMP.11 and the annex to decision 19/CMP.1 in conjunction with decision 3/CMP.11. The 2017 NIR was submitted on 20 September 2017 and the 2016 NIR was submitted on 12 September 2017. The ERT also notes that this issue concerning the timely submission of the NIR was identified in reviews prior to 2016 (e.g. see document FCCC/ARR/2014/MCO, para. 7). In addition, the delay in the submission by Monaco has also been considered on the agenda of the Compliance Committee (see Compliance Committee documents CC/EB/25/2014/1, CC/EB/25/2014/3, CC/EB/26/2015/1, CC/EB/26/2015/2 and CC/EB/27/2015/2). In failing to submit the NIR within six weeks of the submission due date, the ERT considers that Monaco has not met the mandatory requirements in accordance with the "Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol" (decision 15/CMP.1 in conjunction with decision 3/CMP.11), which is one of the conditions by which a Party included in Annex I fails to meet the methodological and reporting requirements under Article 7, paragraph 1, of the	Yes. Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem?[20] If yes, classify by type

Kyoto Protocol for the purpose of the eligibility requirements under the Protocol.

Furthermore, the ERT considers that the late submission under Article 7 is indicative of issues concerning the performance of the national system functions, and has identified the following specific problems:

(a) Insufficient implementation of national institutional arrangements and maintenance of capacity to ensure the timely performance of the functions defined in the guidelines for national systems, as outlined in decision 19/CMP.1, annex, paragraph 10(a), (b) and (d), in conjunction with decision 3/CMP.11, specifically with respect to maintaining the necessary arrangements to ensure the technical capacity of staff involved in the inventory development process to collect data and consistently prepare national annual inventories and supplementary information. During the review, the Party informed the ERT that it could not submit information as projected in the workplan provided in response to the 2015 review owing to significant staff turnover at the national inventory agency in recent years. The loss/change in staff has reduced the inventory agency's technical capacity to manage the functions of the national system. The Party informed the ERT that a new permanent staff member will join the inventory agency in October 2017, which will help to address the agency's technical capacity constraints;

(b) Insufficient implementation of inventory preparation and management procedures defined in the guidelines for national systems, as outlined in decision 19/CMP.1, annex, paragraphs 14(g) and 16(a), in conjunction with decision 3/CMP.11. With regard to paragraph 14(g), the ERT notes that, notwithstanding the delay in the submission of the 2017 NIR, the ERT was informed by the Party that the submission may not have been subject to complete QA/QC procedures, and the Party asked if it would be possible to resubmit the NIR with complete QC after the review. During the review, in response to questions raised by the ERT regarding the provision of evidence of the implementation of general QC procedures consistent with paragraph 16(a), the Party explained that the information is being improved and that it was unable to share an updated copy of the information with the ERT during the review week.

The ERT concludes that, on the basis of the information provided in the NIR and during the review, the national system of Monaco does not sufficiently meet the requirements outlined in decision 19/CMP.1, in conjunction with decision 3/CMP.11. In particular, the ERT considers that the national system of Monaco is not performing the general functions defined in decision 19/CMP.1, annex, paragraphs 10(a), (b) and (d), 14(g) and 16(a), in conjunction with decision 3/CMP.11.

The ERT included this issue in the list of potential problems and further questions raised by the ERT and recommended that Monaco implement the necessary improvements to the functions of the national system and provide to the ERT:

(a) A description (e.g. a table, list or diagram with narrative) of the national institutional arrangements, indicating the roles or allocation of responsibilities among the inventory agency staff in implementing the functions of the national inventory system, including the preparation and management of the inventory development process. The summary should describe how the Party will maintain sufficient arrangements and technical capacity to ensure the continuous and timely performance of the national system functions, and increase the resilience of the national system functions as outlined in decision 19/CMP.1, annex, paragraph 10(a) and (b), in conjunction with decision 3/CMP.11;

(b) An inventory preparation plan and schedule indicating actions and deadlines to prepare the inventory and supplementary

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		information as required by decision 19/CMP.1, annex, paragraph 10(d), in conjunction with decision 3/CMP.11. The plan and schedule should demonstrate implementation of the required preparation and management functions of the national system to ensure a high-quality and timely annual submission; (c) An updated QA/QC plan reflecting all the QA/QC activities and actions necessary to ensure a high-quality and timely annual submission, integrating activities into the inventory preparation process such that it allows sufficient time to implement QC procedures prior to submission, as required by decision 19/CMP.1, annex, paragraph 14(g), in conjunction with decision 3/CMP.11. In response to the potential problems and recommendations described in paragraphs (a–c) above, Monaco provided the ERT with a general description of the national inventory arrangements, a general inventory preparation plan/schedule consisting of high-level steps (November: data collection; December: data checked and processed and calculations made; January: quality checks and writing of NIR chapters; February: finalization of QC and internal and external QA; and March: finalization of the NIR and approval) and a draft QA/QC plan indicating initial elements that were to be further modified and completed for the 2018 submission, namely anticipated QC roles and a general QC checklist. The ERT noted that the responses provided by the Party did not sufficiently address the recommended improvements to the functions of the national system. Specifically: (a) With respect to the recommendation to describe the national institutional arrangements included in subparagraph (a) directly above, Monaco explained that plans are under way to add an additional staff member to the inventory team, reorganize the team to meet submission deadlines and improve the quality of the inventories, and that it notified the Government of Monaco of the difficulties encountered and the need to build capacity. The response provided by the Party did not demonstrate how these efforts will ensure that arrangements are in place to maintain sufficient technical capacity for the timely, continuous and resilient performance of the national system functions, irrespective of staff changes, as per decision 19/CMP.1, annex, paragraph 10(a) and (b), in conjunction with decision 3/CMP.11. The ERT noted that a similar workplan was submitted in response to a potential problem raised in response to the delayed submission of the Party's 2015 NIR (see document FCCC/ARR/2015/MCO, table 5, ID# G.16), but that the workplan did not result in the timely submission of the 2016 or 2017 annual submission; (b) With respect to the recommendation to develop an inventory preparation plan and schedule described in subparagraph (b) directly above, the ERT noted that the schedule shared by Monaco in response to this recommendation does not demonstrate the identification of actions and deadlines necessary to ensure a high-quality and timely annual submission consistent with decision 19/CMP.1, annex, paragraph 10(d), in conjunction with decision 3/CMP.11. The schedule and actions are aggregated, addressing compilation phases such as data collection and emission estimation, but do not disaggregate these phases into specific actions and associated deadlines, and are missing key actions such as the identification of key categories, compilation of the CRF tables, uncertainty estimation and preparation of supplementary information; (c) With respect to the recommendation to develop an updated QA/QC plan described in subparagraph (c) directly above, the ERT notes that the QA/QC plan is under development and the draft shared in response to the list of potential problems includes an initial draft allocation of roles and a QC checklist. However, the plan provided is incomplete and inconsistent with	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem?[20] If yes, classify by type
		decision 19/CMP.1, annex, paragraph 14(g), in conjunction with decision 3/CMP.11, and procedures are not archived in accordance with decision 19/CMP.1, annex, paragraph 16(a), to facilitate updating and application in a timely manner for annual reporting. Further, Monaco did not indicate when the QA/QC plan will be completed to enable its application and integration into the inventory planning and preparation schedule for the 2018 submission, as recommended by the ERT. The ERT concluded that the potential problem with the performance of the national system functions was not resolved and noted that it pertains to language of a mandatory nature and influences the fulfilment of commitments. Therefore, the ERT identified it as a question of implementation in accordance with decision 22/CMP.1 in conjunction with decision 4/CMP.11 (see table 6).	
G.18	CPR	The ERT noted that the CPR was not calculated in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18. The Party reported its CPR as 557,736 t CO_2 eq. However, during the review, the ERT identified that there was a calculation error that led to an incorrect calculation of the CPR. The CPR depends on the calculation of the assigned amount, which relies in turn on the determination of the base-year CO_2 eq emissions. Use of the corrected base-year CO_2 eq emission estimates results in a revised assigned amount of 619,751 t CO_2 eq. Owing to the calculation error, the ERT recalculated the CPR and determined it to be 557,777 t CO_2 eq (see document FCCC/IRR/MCO/2017, tables 3 and 4). The Party agreed with the revised value. The ERT recommends that the Party improve its QA/QC procedures to review the calculation of the inputs for determining the CPR, including the assigned amount and the relevant modalities in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18.	Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
G.19	Kyoto Protocol units	As noted in ID# G.13 in table 3, Monaco submitted its SEF tables on 22 September 2017. The ERT recommends that Monaco submit its SEF tables by 15 April 2018 as required by decision 15/CMP.1.	Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
G.20	QA/QC and verification	The ERT noted that some inconsistencies still exist between the NIR and the CRF tables with regard to AD and the inconsistent application of notation keys (e.g. use of "NO" or "NE" when information is provided in the NIR; see, among others, ID#s E.12, L.9, L.16, W.3 and W.4 below). The ERT encourages Monaco to update its QA/QC procedures as a result of the use of the latest CRF Reporter software and to review the CRF tables to improve consistency in the reporting of information between the NIR and the CRF tables.	Not an issue/problem
G.21	Inventory management	The ERT notes that, while Monaco responded to questions raised by the ERT during the review week, the Party did not provide responses to the initial assessment sent to Monaco seven weeks prior to the review week. In accordance with decision 19/CMP.1, annex, paragraph 16(c), in conjunction with decision 3/CMP.11, Parties shall respond to requests for clarifying inventory information resulting from the different stages of the review process of the inventory information, and information on the national system, in a timely manner in accordance with Article 8 of the Kyoto Protocol. Monaco did not provide any	Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem?[b] If yes, classify by type
		comment on the observations contained in the initial assessment. The initial questions and associated responses are a key input to the individual technical review and facilitate the assessment by the ERT of conformity with the UNFCCC Annex I inventory reporting guidelines, as per decision 13/CP.20, annex, paragraph 75(f). The ERT recommends that Monaco improve its inventory management procedures to enable it to respond to all stages of the review process, in particular the initial assessment, in order to facilitate the timely technical review by the ERT of the annual submission.	
Energy			
E.11	Fuel combustion – reference approach – biomass – CO_2	The CEF for liquid biomass is 25.47 t C/TJ for 1992 according to CRF table 1.A(b). It then decreases for the 1990s and becomes stable at around 19 t C/TJ for 2001 onwards. A similar decrease is not observed for fuels such as gas/diesel oil. The CEFs during the 1990s are significantly different from the IPCC default CEF (19.30 t C/TJ for biogasoline from the 2006 IPCC Guidelines, volume 2, table 1.3). During the review, Monaco explained that it would investigate this issue. The ERT recommends that Monaco explain the reason for the decreasing trend in the CEF for liquid biomass for the 1990s (from 25.47 t C/TJ in 1992 to 19.21 t C/TJ in 2001) and, if appropriate, correct the CEF.	Yes. Transparency
E.12	Fuel combustion – reference approach – biomass – CO_2	Monaco reports 41.28 TJ for the apparent consumption of liquid biomass for 2015 in CRF table 1.A(b). However, "apparent consumption (TJ)" is reported as "NO" because the conversion factor (TJ/unit) is mistakenly reported as "NO". In addition, total biomass consumption reported for the reference approach is different from that reported for the sectoral approach for 1992 onwards (e.g. 449.24 TJ for the reference approach and 428.35 TJ for the sectoral approach for 2015). During the review, Monaco explained that the difference is due to an incorrect calculation in the reference approach. The ERT agrees with this explanation. The ERT recommends that Monaco replace the notation key "NO" with 1 for the conversion factor (TJ/unit) of liquid biomass in CRF table 1.A(b). The ERT also recommends that Monaco correct the error in total biomass consumption reported for the reference approach.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
E.13	Fuel combustion – reference approach – other fossil fuels – CO_2	The default CEF for municipal waste (non-biomass fraction) is 25.0 t C/TJ according to the 2006 IPCC Guidelines (volume 2, table 1.3). Monaco uses the country-specific CEF of 16.57 t C/TJ for 2015, which is lower than the lower end of the default range (20.0 t C/TJ) from the 2006 IPCC Guidelines. During the review, Monaco explained that it would investigate this issue. The ERT recommends that Monaco explain the reasons why the CEF for municipal waste (non-biomass fraction) (16.57 t C/TJ) is lower than the IPCC default value (25.0 t C/TJ, within a range of 20.0–33.0 t C/TJ) and, if appropriate, correct the CEF.	Yes. Accuracy
E.14	1.A.1.a Public electricity and heat production – liquid fuels –	According to the NIR (section 3.2.1.5.3), Monaco estimated the CH_4 and N_2O emissions from public electricity and heat production (1.A.1.a) using the tier 3 default EFs for gas/diesel oil boilers provided in the 2006 IPCC Guidelines (volume 2, table 2.6) (0.9 kg/TJ and 0.4 kg/TJ, respectively). The liquid fuel consumption for public electricity and heat production was 14.24 TJ for 1990 according to CRF table 1.A(a), which is consistent with the apparent consumption for residual fuel oil reported in CRF table 1.A(b). The ERT assumes that residual fuel oil is used in category 1.A.1.a. The 2006 IPCC Guidelines	Yes. Accuracy

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem[29] If yes, classify by type
	CH_4 and N_2O	(volume 2, table 2.6) also provide EFs for residual fuel oil/shale oil boilers (0.8 kg/TJ for CH_4 and 0.3 kg/TJ for N_2O). The same CH_4 and N_2O EFs were applied by the Party for the entire time series. The ERT recommends that Monaco explain in the NIR why it applies the EFs for gas/diesel oil boilers instead of those for residual fuel oil/shale oil boilers for estimating CH_4 and N_2O emissions from public electricity and heat production (1.A.1.a) and correct them, if appropriate. The ERT notes that, even if Monaco applied the incorrect default CH_4 and N_2O EFs for the base-year inventory, the difference in the estimated emissions from applying the higher EFs for residual fuel oil/shale oil boilers would be below the significance threshold as defined in decision 24/CP.19, annex I, paragraph 37(b).	
E.15	1.A.1.a Public electricity and heat production – other fossil fuels – CO_2	Monaco uses a country-specific waste fraction for estimating CO_2 emissions from combustion of other fossil fuels and biomass from public electricity and heat production (1.A.1.a) according to the NIR (section 3.2.1). During the review, Monaco explained that in 2016 it initiated a survey on the waste fraction. The ERT welcomes the efforts made by Monaco and encourages the Party to update the waste fraction on the basis of surveys in future submissions.	Not an issue/problem
E.16	1.A.2 Manufacturing industries and construction – all fuels – CO_2, CH_4 and N_2O	The category manufacturing industries and construction accounted for 17.6 per cent of the gross domestic product of Monaco in 2015 according to the *Monaco Statistics Pocket: Edition 2017* (p.9), compiled by the Monegasque Institute of Statistics and Economic Studies (2017). In response to a question regarding the fuel consumption of these industries, Monaco explained that the fossil fuels used in these industries are included in the residential subcategory (1.A.4.b). The ERT also found literature to show that the gas consumption in 2015 for industry, residential and other was 6,124 MWh, 14,223 MWh and 46,278 MWh, respectively (see p.22 of the *Rapport d'Activité 2016* published by SMEG (2017)). The total of 66,625 MWh can be converted to 215.87 TJ, which is close to the natural gas consumption for the residential subcategory reported in CRF table 1.A(a) (215.88 TJ). The ERT assumes that the emissions related to gas combustion from residential for 2015 include those from manufacturing industries and construction in addition to those from commercial/institutional (see ID# E.6 in table 3). The SMEG report implies that SMEG has the required data to disaggregate the gas consumption among categories 1.A.2, 1.A.4.a and 1.A.4.b. According to the 2017 NIR (section 3.2.6.1.5), SMEG provides the data on the total natural gas consumption to the inventory agency for estimating the emissions from the subcategory residential (1.A.4.b). The ERT recommends that Monaco disaggregate emissions from categories 1.A.2, 1.A.4.a and 1.A.4.b. To aid in this effort, the ERT recommends that Monaco conduct a survey on fuel consumption of manufacturing industries and construction (1.A.2) and report in the NIR on the progress made in conducting such a survey. In conducting such a survey, the ERT encourages Monaco to contact SMEG to determine whether it can provide data on gas consumption for each category for the entire time series. The ERT also recommends that Monaco report the emissions from manufacturing industries and construction (1.A.2) as "IE" until the completion of the survey.	Yes. Comparability
IPPU			
I.11	2.D.1 Lubricant use – CO_2	The ERT noted that CO_2 emissions from lubricant use are reported as "NO" for the entire time series. However, since these emissions are associated with engines (vehicles or stationary), it is very likely that they occur in Monaco. The 2006 IPCC Guidelines (volume 3, chapter 5, pp.5.6–5.10) contain a method and default EF for this category. During the review, Monaco	Yes. Completeness

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem[20] If yes, classify by type
		explained that, following its QA/QC programme, an investigation was initiated in 2017 to estimate the quantities of lubricants sold in Monaco and that, taking these results into consideration, there will be an improvement in the accuracy of the emission estimates for the entire time series, following the guidance provided in the 2006 IPCC Guidelines, in future submissions. The ERT believes that future ERTs should consider this issue carefully to ensure that it does not lead to an underestimation of CO_2 emissions. The ERT recommends that Monaco estimate CO_2 emissions from lubricant use and report on the method and EFs used and the quality checks performed.	
I.12	2.D.2 Paraffin wax use – CO_2	The ERT noted that emissions from paraffin wax are reported as "NO" for the entire time series. However, since they are associated with applications such as candles, corrugated boxes, paper coating, board sizing, food production, wax polishes, surfactants (used in detergents) and many others, it is very likely that they occur in Monaco. The 2006 IPCC Guidelines (volume 3, chapter 5, pp.5.11–5.13) contain a method and default EF for this category. During the review, Monaco explained that there is no production of candles, corrugated boxes, paper coating, board sizing, food, wax polishes or surfactants in the country and that it therefore used the notation key "NO". Monaco also explained that, even if these products are used, it is not able to obtain the related AD (and it is even more difficult to obtain AD for the entire time series) as requested in the 2006 IPCC Guidelines. The ERT also noted that Monaco did not demonstrate that the emissions are below the significance threshold defined in decision 24/CP.19, annex I, paragraph 37(b). The ERT recommends that Monaco report these emissions in the next submission, for example by investigating data used by France, as Monaco does for other sources. In the event that data are not available to estimate the emissions for this category, the ERT recommends that Monaco temporarily report the notation key "NE" for paraffin wax use.	Yes. Completeness
I.13	2.F.1 Refrigeration and air conditioning – HFCs	Recognizing that Monaco submitted its 2016 NIR late and that a review of the 2016 annual submission had not yet taken place at the time of the review of the 2017 submission, the ERT nevertheless noted a change in the reported data on historical HFC-134a emissions between the previous submission reviewed (the 2015 submission) and the 2017 submission. Specifically, the ERT noted that Monaco recalculated HFC-134a emissions from mobile air conditioning in its 2017 submission compared with the 2015 annual submission and that the Party included explanations for this recalculation in its 2017 NIR. In its 2015 submission, Monaco used a tier 1 EF of 15.0 per cent and in its 2017 submission it used a country-specific tier 2 EF (8.4 per cent for 2015). The ERT noted that, in addition to this change in EF, there was also a significant change in the AD on the amount in operating systems (average annual stocks) (decreasing from 28.22 t for 2013 in the 2015 annual submission to 15.15 t for 2013 in the 2017 submission). During the review, Monaco provided the calculation file to the ERT and it became clear to the ERT that the decrease in AD for HFC-134a emissions could be fully attributed to the fact that emissions of the refrigerants R12 and R1234yf, which do not contain HFCs, were included in the calculations in the 2015 submission. The ERT commends Monaco for including information on this recalculation and the corresponding effect on estimated emissions in its NIR. The ERT recommends that Monaco, for future recalculations, provide information on effects separately for each recalculation, in this case for the change in EF and the change in AD.	Yes. Transparency
I.14	2.F.1	The ERT noted that for stationary air conditioning the emissions of HFC-134a show a strong varying trend, with a high peak in	Yes. Transparency

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem[a]? If yes, classify by type
	Refrigeration and air conditioning – HFCs	2000 (1.9486 t) and smaller peaks in 2004, 2007, 2009 and 2014. Similarly, there are fluctuations in HFC-143a emissions, with peaks in 2002, 2008 (highest peak of 0.1291 t) and 2011–2013. During the review, Monaco explained that the peaks are linked to variations in data provided by companies and that the companies are not able to provide Monaco with further explanations for the variations other than stating that they are due to "sales fluctuations" across years. Monaco gave, as an example, a large air conditioning unit that was installed in 2015 by a company located in Monaco, which required a large amount of R507 refrigerant to fill it. The ERT recommends that Monaco include information in the NIR to describe observed fluctuations in HFC emissions from stationary air conditioning, for example by explaining that the trends are due to sales fluctuations from one year to the next.	
Agriculture			
A.1	3. General (agriculture)	Monaco reported in its NIR that no agricultural practices occur in the country. During the review, the ERT asked whether the Party could confirm that no agricultural practices occur in Monaco with the provision of supporting documentation. In response, Monaco confirmed that no agricultural practices occur and provided a topographical map. The Party further indicated that it is a city State of 2 km^2 and is completely urbanized. The Party explained that agricultural produce comes mainly from France and Italy.	Not an issue/problem
LULUCF			
L.9	Land representation – CO_2	Monaco reported the notation key "NO" for all categories in the annual land-use change matrix in CRF table 4.1. Monaco estimates emissions for which it reports the areas in settlements remaining settlements in CRF table 4.E, which should be reflected in CRF table 4.1. During the review, Monaco explained that it would correct this error in the next submission. The ERT recommends that Monaco complete CRF table 4.1 with the land area for settlements remaining settlements.	Yes. Comparability
L.10	4.E.1 Settlements remaining settlements – CO_2	Monaco explained in the NIR that a survey undertaken by the Department of Urban Amenities provided information on the total area of green spaces, the volume of crown cover between 1990 and 2015 and the total number of trees between 1990 and 2012, and that the years after 2012 have been calculated using linear extrapolation. The ERT noted a significant loss of crown cover area from 29,19 ha in 2014 to 28,77 ha in 2015 in the CRF tables, which is also reflected in the final emissions for 2015, which evolved from a net sink (–0.03 kt CO_2 eq) to a net source (0.07 kt CO_2 eq). The ERT was unable to recalculate the annual crown cover change provided in the table on page 168 of the NIR using the information provided by Monaco. During the review, Monaco clarified that the steep reduction observed is due to the outcome of public work initiated in 2015 and is expected to continue until 2020. In addition, Monaco explained that a report is under way that will provide more information on the calculation methodology and will be included in the next submission. The ERT commends the Party for the efforts of the Department of Urban Amenities to undertake a survey and recommends that the Party include in the NIR information on the area of crown cover change, in particular the definition of the "tree crown cover" land-use category and the related threshold criteria for conversion from "tree crown cover" to "other settlements", together with a clear explanation of any fluctuations.	Yes. Transparency
L.11	4.E.1	Monaco provided estimates of emissions due to losses of tree crown cover area as described on page 168 of the NIR and	Yes. Accuracy

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or [illegible] yes, classify by type
	Settlements remaining settlements – CO_2, CH_4 and N_2O	information on losses of woody and non-woody biomass on page 166 in the context of biomass collected for burning purposes. It is unclear how Monaco calculated the emissions related to the losses of crown cover and the reduction in biomass. During the review, Monaco explained that losses under LULUCT are calculated on the basis of the area of crown cover loss, clarifying only that including net carbon losses from green waste would add a high level of uncertainty to the estimates. Therefore, the ERT is of the view that Monaco's approach might lead to an underestimation of losses from biomass in areas of remaining tree crown cover. In the CRF table, Monaco reports "NO" for AD and CO_2, CH_4 and N_2O emissions from biomass burning in CRF table 4(V). Since CH_4 and N_2O emissions are accounted for under the energy sector, Monaco should report the notation key "IE" in CRF table 4(V) (biomass burning) for settlements for CH_4 and N_2O emissions instead of "NO" (see ID# L.1 in table 3). The ERT recommends that Monaco include information in the NIR on how losses are calculated using allometric equations and that the Party use the correct notation key ("NE") in CRF table 4(V) for CO_2 emissions from green waste collection instead of "NO" and "IE" for CH_4 and N_2O emissions instead of "NO". The ERT encourages Monaco to improve the description in the NIR of the characterization of green waste related to origin, size and tree type.	
L.12	4.E.1 Settlements remaining settlements – CO_2	The emissions for the 2017 annual submission have been recalculated compared with the 2016 annual submission. For the area of other settlements and tree crown cover, significant differences for each year have been identified between the 2016 and 2017 NIRs. In general, there is a trend that in the 2017 submission more tree crown cover has been reported than in the 2016 annual submission over the entire time series (e.g. for 2014, tree crown cover = 0.024 kha (2016 submission) and 0.029 kha (2017 submission); and other settlements = 0.179 kha (2016 submission) and 0.174 kha (2017 submission)). The NIR of the 2017 submission does not provide a clarification for the difference between the submissions. During the review, Monaco explained that the difference is related to the use of a different estimator for area based on a different model for the shape of Monaco's trees. The Party recognized that the clarification is missing and will provide it in the next submission. The ERT commends Monaco for conducting recalculations and recommends that the Party describe the underlying assumptions regarding the definitions of other settlements and tree crown cover with respect to the shape of trees. Should this category again be subject to recalculations in the next submission, the ERT recommends that the Party fully describe the reason for such recalculations in the section on recalculations in the NIR.	Yes. Transparency
L.13	4.G HWP – CO_2	Monaco has selected the stock change approach (approach A) for estimating emissions related to HWP. Monaco reported the notation key "NO" in CRF tables 4.Gs1 and 4.Gs2 for the whole time series. Monaco did not provide any explanation of an applied method in the NIR. The ERT notes that, in case the HWP contribution is significant, it is good practice to provide statistics on volumes of imported processed wood. Countries are encouraged to use the tier 1 method to estimate HWP variables to aid in judging whether the annual change is insignificant (2006 IPCC Guidelines, volume 4, chapter 12.2.1). During the review, Monaco assured the ERT that it would revise the CRF tables for HWP for the next submission. The ERT recommends that Monaco implement a tier 1 method to estimate whether the HWP contribution is significant. If significant, the ERT recommends that the Party report its HWP contribution and the volumes of imported wood products in CRF tables 4.Gs1 and 4.Gs2, respectively. In any case the ERT recommends that the Party provide an explanation of the application of the tier 1 assessment in the NIR.	Yes. Accuracy

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem?[b] If yes, classify by type
L.14	4(I) Direct N_2O emissions from N inputs to managed soils – N_2O	Monaco estimated the direct emissions due to synthetic fertilizer application on soils using equation 11.2 (tier 2 level) from the 2006 IPCC Guidelines (volume 4, chapter 11). The Party provided a table in the NIR (p.170) with information on the quantity of N applied to land and the total direct emissions. However, it is unclear which types of fertilizer (by N content) have been used, as well as the respective quantity by fertilizer type. In addition, no country-specific EFs or reference to an IPCC default EF have been provided in the NIR. During the review, Monaco provided information on N fertilizers by type, the percentage of N and the EFs used. The ERT recommends that Monaco include the EFs used for synthetic fertilizer in the NIR and encourages the Party to include disaggregated information on N fertilizers by type and the percentage of N.	Yes. Transparency
L.15	4(I) Direct N_2O emissions from N inputs to managed soils – N_2O	Monaco provided data on the recalculation of direct N_2O emissions from managed soils. The total emissions reported in the 2017 annual submission (0.000041 kt N_2O) are significantly lower than those reported in the 2016 annual submission (0.00013 kt N_2O) for 2014. The IEF reported in the 2017 annual submission for direct N_2O emissions is 0.01 kg N_2O–N/kg N compared with an IEF of 1.56 kg N_2O–N/kg N reported in the 2016 submission. The Party explained in the NIR that the use of equation 11.2 from the 2006 IPCC Guidelines (volume 4) in the 2017 submission instead of equation 11.1 as used in the 2016 submission is the basis for the changes; however, the ERT is of the view that those equations are intrinsically the same. The ERT notes a significant difference in the AD reported in CRF table 4(I), from 53.8 6 kg N/year in the 2016 submission to 2,594.35 kg N/year in the 2017 submission. During the review, Monaco explained that it used the same EF for both submissions (0.01 kg N_2O–N/kg N) and that the estimate provided in the 2017 submission does not include emissions from drainage/management of organic soils, as was done for the estimate in the 2016 submission because leaching is negligible in regions where rainfall is lower than evapotranspiration. The ERT notes that excluding leaching cannot be the basis for the difference in the IEF and that the method used to estimate emissions from managed organic soils has not been explained in the 2017 NIR. The ERT recommends that Monaco transparently document the AD and EFs used to estimate direct emissions from managed soils in the NIR and ensure that any methodological changes are reported in the relevant sections of the NIR on recalculations.	Yes. Accuracy
L.16	4(IV).1 Atmospheric deposition – N_2O	Monaco reported a value for the annual quantity of synthetic fertilizer N (2.63 kg N/year) in CRF table 4(IV) that is 1,000 times smaller than the value reported in CRF table 4(I) (2,633.02 kg N/year). The N_2O IEF reported in CRF table 4(IV) is 1 kg N_2O–N/kg N, which is high in comparison with the default EF from the 2006 IPCC Guidelines (0.01 kg N_2O–N (kg NH_3–N + NOx–N volatilized)$^{-1}$) (volume 4, chapter 11, table 11.3). During the review, Monaco clarified that the IPCC default EF had been used with a gas fraction of 10 per cent. Final emission estimates are correct; however, the AD reported in CRF tables 4(I) and 4(IV) for direct and indirect emissions from soils should be consistently reported. The ERT recommends that Monaco consistently report values of AD in the correct cells of CRF tables 4(I) and 4(IV) to ensure comparability and consistency between the estimates of direct and indirect N_2O emissions from soils.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

Waste

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem[20] If yes, classify by type
W.2	5.D.1 Domestic wastewater – CH_4	The ERT detected large inter-annual variations in total organic product in CRF table 5.D, especially between 2010 (1.44 kt degradable C/year) and 2012 (1.12 kt degradable C/year), corresponding to a decrease of 22 per cent, followed by an increase of 45 per cent to 1.61 kt degradable C/year in 2013. During the review, the Party explained that, during work to strengthen treatment capacity, the wastewater treatment plant was shut down for certain periods. In addition, it was revealed that the total organic product reported in CRF table 5.D did not contain part of the organic load that was directly discharged to the sea (referred to as "TOWa" in the NIR, relating to the amount of total organically degradable carbon in wastewater discharged without treatment). Despite the missing AD, the ERT was able to confirm with the Party that the associated emissions are included in CRF table 5.D. The ERT recommends that the Party include explanations for any large inter-annual changes in the total organic product in the NIR and ensure that the total organic product reported in CRF table 5.D contains all degradable carbon, including the biochemical oxygen demand discharged to the sea.	Yes. Transparency
W.3	5.D.1 Domestic wastewater – N_2O	The NIR states that N_2O emissions are calculated using equations 6.7 and 6.8 of the 2006 IPCC Guidelines (volume 5, chapter 6). These equations explicitly contain the AD for $N_{EFFLUENT}$. However, in CRF table 5.D, "N in effluent" is reported as "NE". During the review, the Party confirmed that $N_{EFFLUENT}$ was estimated in the calculations. The ERT recommends that Monaco include the AD for $N_{EFFLUENT}$ in CRF table 5.D.	Yes. Comparability
W.4	5.D.1 Domestic wastewater – N_2O	The ERT found an inconsistency between CRF table 5.D (additional information) and the NIR regarding the parameters for $F_{NON\text{-}CON}$ and $F_{IND\text{-}COM}$. In CRF table 5.D, the notation key "NO" is used for both parameters. During the review, the Party confirmed that the NIR is correct and that values of 1.1 and 1.25 for $F_{NON\text{-}CON}$ and $F_{IND\text{-}COM}$, respectively, were used for the Party's estimate of N_2O emissions. The ERT notes that the population data in the same CRF table are provided in the incorrect unit (the reported population is too high by a factor of 1,000). The ERT recommends that Monaco report in the additional information table of CRF table 5.D the correct population and the actual values of $F_{NON\text{-}CON}$ and $F_{IND\text{-}COM}$ used in the calculations.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
W.5	5.D.1 Domestic wastewater – CH_4	In the NIR (section 7.4.1.3), a graph is presented on the changes in the methane conversion factor. Based on the methodology applied by the Party, recent values (from 2012) higher than 0.15 indicate that the wastewater plant is overloaded on more than half the days of the year. During the review, Monaco confirmed this observation. The Party applies the default methane conversion factor value of 0.3 in situations of overload. The ERT notes that in cases of overload, the amount of total organically degradable carbon in wastewater might not always be removed from the wastewater but end up in the effluent of the wastewater plant. While the calculation method applied by Monaco is in line with the 2006 IPCC Guidelines, the ERT encourages the Party to collect information on the biochemical oxygen demand content of the effluent, and refine the calculation method used accordingly.	Not an issue/problem
W.6	5.D.2 Industrial wastewater –	Monaco reported the notation key "NO" in CRF table 5.D for industrial wastewater. The NIR (p.177) states that wastewater	Yes. Comparability

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem?[a] If yes, classify by type
	CH_4	produced by economic activities is treated together with domestic wastewater. The ERT recommends that Monaco use the notation key "IE" instead of "NO" in CRF table 5.D for industrial wastewater and describe in CRF table 9 that these emissions are included together with domestic wastewater.	
KP-LULUCF			
KL.2	General (KP-LULUCF) – CO_2	Monaco mentions in the NIR that results from national surveys carried out by the Department of Urban Amenities are used to calculate the area of tree crown cover and other settlements. No further analysis of the method for deriving the land-use area and changes on the basis of the results from the surveys was provided. According to decisions 2/CMP.7, annex, paragraph 25, and 2/CMP.8, annex II, paragraph 2(b)(i), Parties shall ensure that their national systems can identify areas of land subject to KP-LULUCF activities, in particular afforestation, and geographic information on these areas shall be provided by each Party in their national inventories. During the review, Monaco clarified that the data on land-use areas are taken from an annual survey on park and garden areas and that it is planning to provide information on the relation to the forest definition in the next submission. In addition, Monaco clarified that additional topographical and aerial survey data gathered every five years since 2009 are available from its Department of Forward Studies, Urban Planning and Mobility and older data are available from the French National Institute of Geographic and Forest Information. The ERT commends Monaco for its ongoing work and recommends that the Party include a comprehensive time-series analysis of land areas in its NIR. The ERT encourages Monaco to include in the NIR, if used in the analysis, the results of aerial surveys of its Department of Forward Studies, Urban Planning and Mobility and the French National Institute of Geographic and Forest Information.	Yes. Accuracy
KL.3	General (KP-LULUCF) – CO_2	Monaco did not provide an FM cap in its accounting table for the second commitment period of the Kyoto Protocol. The ERT noted that Monaco does not have an FMRL reported in the appendix to decision 2/CMP.7, which contains a footnote explaining that Monaco did not propose an FMRL owing to its lack of forest land. Nevertheless, the ERT finds that Monaco could calculate an FM cap, calculated as 3.5 per cent of the base-year emissions, and report this value in the accounting table. During the review, the ERT calculated the FM cap to be 27.809 kt CO_2 eq. Monaco agreed with this value. The ERT recommends that Monaco report its FM cap in the CRF accounting table.	Yes. Comparability

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

VI. Application of adjustments

10. The ERT has not identified the need to apply any adjustments to the 2017 annual submission of Monaco.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

11. Monaco has elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF activities is not applicable for the 2017 review.

VIII. Question of implementation

12. The ERT considers that the Party has not satisfactorily resolved during the review the potential problems included in table 6, which pertain to language of a mandatory nature and influence the fulfilment of commitments. Therefore, the ERT has identified these problems as a question of implementation in accordance with decision 22/CMP.1, in conjunction with decision 4/CMP.11.

Table 6
Question of implementation for Monaco

Unresolved problem of a mandatory nature	*Reference to relevant decision*	*Description of the problem*
National system	Decision 15/CMP.1, paragraph 3(a), in conjunction with: (a) Decision 19/CMP.1, annex, paragraph 10(a), (b) and (d), in conjunction with decision 3/CMP.11 (b) Decision 19/CMP.1, annex, paragraphs 14(g) and 16(a), in conjunction with decision 3/CMP.11	For the full description of the problem, see ID# G.1 in table 3 and ID# G.17 in table 5

Annex I

Overview of greenhouse gas emissions and removals for Monaco for submission year 2017 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by Monaco

1. Tables 7–10 provide an overview of total GHG emissions and removals as submitted by Monaco.

Table 7
Total greenhouse gas emissions for Monaco, base year[a]–2015
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[b]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]*	*KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[d]*	*KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)[e]*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*	*FM[f]*
FMRL								–
Base year	99.32	99.32	NA	NA	NO			
1990	99.31	99.31	NA	NA				
1995	103.51	103.53	NA	NA				
2000	107.80	107.84	NA	NA				
2010	86.68	86.73	NA	NA				
2011	83.10	83.14	NA	NA				
2012	87.03	87.06	NA	NA				
2013	87.43	87.46	NA	NA				
2014	79.78	79.81	NA	NA				
2015	81.78	81.71	NA	NA				

Note: Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4, N_2O and NF_3, and 1995 for HFCs, PFCs and SF_6. Monaco has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The Party has not reported indirect CO_2 emissions in CRF table 6.

[c] The value reported in this column refers to 1990. Although LULUCF was a source of emissions in 1990, Monaco reports in its annual submission that conversion of forests (deforestation) does not occur in the country and there are no emissions from deforestation to add to the base year.

[d] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely AR and deforestation.

[e] Monaco's CRF tables for KP-LULUCF activities have been left blank (see ID# KL.1 in table 3).

[f] The appendix to decision 2/CMP.7 does not contain an FMRL for Monaco because Monaco did not propose such a level owing to its lack of forest land.

Table 8
Greenhouse gas emissions by gas for Monaco, excluding land use, land-use change and forestry, 1990–2015
(kt CO_2 eq)

	CO_2[a]	CH_4	N_2O	HFCs	PFCs	*Unspecified mix of HFCs and PFCs*	SF_6	NF_3
1990	95.30	2.13	1.65	0.02	NO, IE	NO	0.22	NO
1995	98.99	1.61	2.69	0.12	NO, IE	NO	0.12	NO
2000	98.32	2.45	3.48	3.47	NO, IE	NO	0.12	NO
2010	75.46	2.55	4.33	4.28	NO, IE	NO	0.11	NO
2011	71.87	1.87	4.23	5.07	NO, IE	NO	0.11	NO
2012	75.16	3.11	4.43	4.25	NO, IE	NO	0.11	NO
2013	74.45	3.10	4.50	5.31	NO, IE	NO	0.11	NO
2014	68.52	2.68	4.09	4.40	NO, IE	NO	0.11	NO
2015	68.72	3.11	3.76	6.01	NO, IE	NO	0.11	NO
Per cent change 1990–2015	**–27.9**	**46.1**	**128.4**	**37 964.1**	**NA**	**NA**	**–51.5**	**NA**

Note: Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.
[a] Monaco did not report indirect CO_2 emissions in CRF table 6.

Table 9
Greenhouse gas emissions by sector for Monaco, 1990–2015
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	98.50	0.27	NA, NO	0.00	0.55	NO
1995	102.14	0.30	NA, NO	–0.02	1.10	NO
2000	102.03	3.76	NA, NO	–0.04	2.05	NO
2010	78.20	6.15	NA, NO	–0.05	2.38	NO
2011	74.56	6.89	NA, NO	–0.04	1.70	NO
2012	78.05	6.08	NA, NO	–0.04	2.94	NO
2013	77.51	7.01	NA, NO	–0.03	2.95	NO
2014	71.46	5.80	NA, NO	–0.03	2.55	NO
2015	71.61	7.09	NA, NO	0.07	3.01	NO
Per cent change 1990–2015	**–27.3**	**2 550.6**	**NA**	**4 217.1**	**450.5**	**NA**

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions. (2) Monaco did not report indirect CO_2 emissions in CRF table 6.

Table 10

Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year[a]–2015, for Monaco

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Article 3.3 of the Kyoto Protocol*		*FM and elected Article 3.4 activities of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL								
Technical correction								
Base year	NO							
2013								
2014								
2015								
Per cent change base year–2015								

Notes: (1) Monaco did not report information in the CRF tables on accounting and the base year for emissions and removals from KP-LULUCF activities. The KP-LULUCF tables were left blank in the Party's submission (see ID# KL.1 in table 3). (2) Values in this table include emissions on lands subject to natural disturbances, if applicable.

[a] Monaco has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column refers to 1990.

2. Table 11 provides an overview of relevant key data for Monaco's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 11
Key relevant data for Monaco under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Key parameters	*Values*
Periodicity of accounting	(a) AR: commitment period accounting
	(b) Deforestation: commitment period accounting
	(c) FM: commitment period accounting
	(d) CM: not elected
	(e) GM: not elected
	(f) RV: not elected
	(g) WDR: not elected
Election of activities under Article 3, paragraph 4	None
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF	3.476 kt CO_2 eq (27.809 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. AR in 2015	NA
2. Deforestation in 2015	NA
3. FM in 2015	NA
4. CM in 2015	NA
5. GM in 2015	NA
6. RV in 2015	NA
7. WDR in 2015	NA

Annex II

Information to be included in the compilation and accounting database

Tables 12–14 include the information to be included in the compilation and accounting database for Monaco. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable), as well as the final data to be included in the compilation and accounting database.

Table 12
Information to be included in the compilation and accounting database for 2015, including on the commitment period reserve, for Monaco
($t CO_2 eq$)

	Original submission[a]	*Revised estimates*	*Adjustment*	*Final*
CPR	557 736	557 777		557 777
Annex A emissions for 2015				
CO_2	68 723			68 723
CH_4	3 111			3 111
N_2O	3 759			3 759
HFCs	6 009			6 009
PFCs	NO, IE			NO, IE
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	107			107
NF_3	NO			NO
Total Annex A sources	**81 709**			**81 709**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015				
3.3 AR				
3.3 Deforestation				
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015				
3.4 FM				

[a] Monaco did not report information in the CRF tables on accounting and the base year for emissions and removals from KP-LULUCF activities. The KP-LULUCF tables were left blank in the Party's submission (see ID# KL.1 in table 3).

Table 13
Information to be included in the compilation and accounting database for 2014 for Monaco
($t CO_2 eq$)

	Original submission[a]	*Revised estimates*	*Adjustment*	*Final*
Annex A emissions for 2014				
CO_2	68 525			68 525
CH_4	2 678			2 678
N_2O	4 093			4 093
HFCs	4 399			4 399
PFCs	NO, IE			NO, IE
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	114			114
NF_3	NO			NO

	Original submission[a]	*Revised estimates*	*Adjustment*	*Final*
Total Annex A sources	**79 809**			**79 809**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 AR				
3.3 Deforestation				
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 FM				

[a] Monaco did not report information in the CRF tables on accounting and the base year for emissions and removals from KP-LULUCF activities. The KP-LULUCF tables were left blank in the Party's submission (see ID# KL.1 in table 3).

Table 14

Information to be included in the compilation and accounting database for 2013 for Monaco

($t CO_2 eq$)

	Original submission[a]	*Revised estimates*	*Adjustment*	*Final*
Annex A emissions for 2013				
CO_2	74 450			74 450
CH_4	3 100			3 100
N_2O	4 499			4 499
HFCs	5 305			5 305
PFCs	NO, IE			NO, IE
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	107			107
NF_3	NO			NO
Total Annex A sources	**87 461**			**87 461**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 AR				
3.3 Deforestation				
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 FM				

[a] Monaco did not report information in the CRF tables on accounting and the base year for emissions and removals from KP-LULUCF activities. The KP-LULUCF tables were left blank in the Party's submission (see ID# KL.1 in table 3).

Annex III

Additional information to support findings in table 2

A. Missing categories that may affect completeness

1. The categories for which methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of reporting in the Party's inventory are the following:

(a) CO_2 emissions from lubricant use (see ID# I.11 in table 5);

(b) CO_2 emissions from paraffin wax use (see ID# I.12 in table 5);

(c) CO_2, CH_4 and N_2O emissions from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (see ID# KL.1 in table 3).

B. Recommendation for an in-country review: list of issues

2. The ERT has recommended that the next review for Monaco be conducted as an in-country review. As noted in table 5, ID# G.17, the ERT has concluded that the Party is not sufficiently implementing decision 15/CMP.1 and the annex to decision 19/CMP.1, in conjunction with decision 3/CMP.11. The ERT also notes that the issue concerning the timely submission of the NIR was identified in reviews prior to 2016 (e.g. see document FCCC/ARR/2014/MCO, para. 7). In particular, the ERT considers that the national system of Monaco is not performing the general and specific functions defined in decision 19/CMP.1, annex, paragraphs 10(a), (b) and (d), 14(g) and 16(a), in conjunction with decision 3/CMP.11.

3. In accordance with decision 13/CP.20, annex, paragraph 64, the ERT has provided a list of questions and issues to be addressed during this in-country review, as set out below, that are in addition to the list of issues identified in tables 3 and 5.

4. Key areas that the next ERT conducting the in-country review should consider are as follows:

(a) The ERT notes that several issues should be closely assessed by the next ERT, in particular related to Monaco's ability to maintain arrangements that ensure sufficient technical capacity to support the timely performance of the functions necessary for the national system to meet the Party's reporting commitments. The in-country review should address all mandatory issues related to inventory planning, preparation and management, including QA/QC planning and implementation;

(b) Assess whether Monaco has increased the capacity to maintain national arrangements for the timely performance of the necessary general and specific functions of inventory preparation, including understanding the allocation of responsibilities among the inventory agency staff in implementing the functions of the national inventory system, including the planning, preparation and management of the inventory development process and how the Party will maintain sufficient technical capacity to ensure the continuous and timely performance of the national system functions and increase the resilience of the national system to staff turnover, as required by decision 19/CMP.1, annex, paragraph 10(a) and (b), in conjunction with decision 3/CMP.11;

(c) Assess whether Monaco has an inventory preparation plan and schedule in place indicating actions and deadlines for the preparation of the inventory and supplementary information, as required by decision 19/CMP.1, annex, paragraph 10(d), in conjunction with decision 3/CMP.11, and whether the schedule provides sufficient detail to ensure a high-quality and timely annual submission (e.g. the inclusion of dates for the start and end of data collection, estimation, the identification of key categories, the draft and

final NIR preparation, compilation of the CRF tables, estimation of uncertainty, supplementary information, implementation of QA/QC procedures);

(d) Assess whether Monaco has a documented QA/QC plan in place reflecting QA/QC procedures consistent with the 2006 IPCC Guidelines, including a schedule to integrate procedures into the overall inventory preparation schedule allowing sufficient time to implement QC procedures prior to submission, as required by decision 19/CMP.1, annex, paragraph 14(g), in conjunction with decision 3/CMP.11;

(e) Check whether Monaco has provided documentation of the implementation of the QA/QC procedures and internal and external reviews, as required by decision 19/CMP.1, annex, paragraph 16(a), in conjunction with decision 3/CMP.11.

Annex IV

Documents and information used during the review

A. Reference documents

Reports of the Intergovernmental Panel on Climate Change

IPCC. 2000. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. J Penman, D Kruger, I Galbally, et al. (eds.). Hayama, Japan: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency/Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/gp/english/.

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

Annual review reports

Reports on the individual review of the 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2015 annual submissions of Monaco, respectively, contained in documents FCCC/ARR/2008/MCO, FCCC/ARR/2009/MCO, FCCC/ARR/2010/MCO, FCCC/ARR/2011/MCO, FCCC/ARR/2012/MCO, FCCC/ARR/2013/MCO, FCCC/ARR/2014/MCO and FCCC/ARR/2015/MCO.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at http://unfccc.int/resource/webdocs/agi/2017.pdf.

American Petroleum Institute. 2009. *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry*. T Shires, CJ Loughran, S Jones and E Hopkins. Available at http://www.api.org/~/media/Files/EHS/climate-change/2009_GHG_COMPENDIUM.pdf.

Annual status report for Monaco for 2017. Available at http://unfccc.int/resource/docs/2017/asr/mco.pdf.

Compliance Committee document CC/EB/25/2014/1. Available at http://unfccc.int/files/kyoto_protocol/compliance/enforcement_branch/application/pdf/cc-eb-25-2014-1__provisional_agenda_and_annotations.pdf.

Compliance Committee document CC/EB/25/2014/3. Available at https://unfccc.int/files/kyoto_protocol/compliance/enforcement_branch/application/pdf/cc-eb-25-2014-3_report_on_the_meeting.pdf.

Compliance Committee document CC/EB/26/2015/2. Available at https://unfccc.int/files/kyoto_protocol/compliance/enforcement_branch/application/pdf/cc-eb-26-2015-2_report_on_the_meeting.pdf.

Monegasque Institute of Statistics and Economic Studies. 2017. *Monaco Statistics Pocket Edition 2017*. Available at http://en.gouv.mc/Policy-Practice/The-Economy/Analysis-and-Statistics/Publications/monaco-statistics-pocket.

SMEG. 2017. *Rapport d'Activité 2016*. Available at http://en.calameo.com/read/00485972466d4ec92caded?authid=6QfBNSiwaGMs.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Jérémie Carles (Department of the Environment), including additional material on the methodology and assumptions used.